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Title	Local search methods for the cumulative flow shop scheduling problem
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Publication date	2026-07-01
Original Citation	Missaoui, A, Neufeld, J S & O'Sullivan, B 2026, 'Local search methods for the cumulative flow shop scheduling problem', Operations Research Perspectives, vol. 17, 100403, pp. 1-16. https://doi.org/10.1016/j.orp.2026.100403
Type of publication	Article (peer-reviewed)
Link to publisher's version	https://www.scopus.com/pages/publications/105043365267 - 10.1016/j.orp.2026.100403
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Local Search Methods for the Cumulative Flow Shop Scheduling Problem: Supplementary Material

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Calibration of Hybrid Simulated Annealing (HSA) by Naderi et al. [2009]

Table 1: Tested parameter levels for HSA

Parameters	**Levels**
T_0	10,15,20
N_t	150,200,250
N_s	30,60,100
N_m	50,100,150,200

Analysis of Variance for RPD - Type III Sums of Squares

Source	*Sum of Squares*	*Df*	*Mean Square*	*F-Ratio*	*P-Value*
MAIN EFFECTS					
A:Nt	0,0000790123	2	0,0000395062	0,00	1,0000
B:Ns	331,864	2	165,932	68,71	0,0000
C:T0	32,1278	2	16,0639	6,65	0,0013
D:Nm	27,8134	3	9,27112	3,84	0,0092
INTERACTIONS					
AB	0,00115628	4	0,000289071	0,00	1,0000
AC	0,000500568	4	0,000125142	0,00	1,0000
AD	0,00161027	6	0,000268379	0,00	1,0000
BC	48,5627	4	12,1407	5,03	0,0005
BD	32,843	6	5,47383	2,27	0,0345
CD	2,42516	6	0,404193	0,17	0,9855
RESIDUAL	117271,	48560	2,41497		
TOTAL (CORRECTED)	117747,	48599			

All F-ratios are based on the residual mean square error.

The StatAdvisor

Figure 1: ANOVA: Results for calibration of HSA

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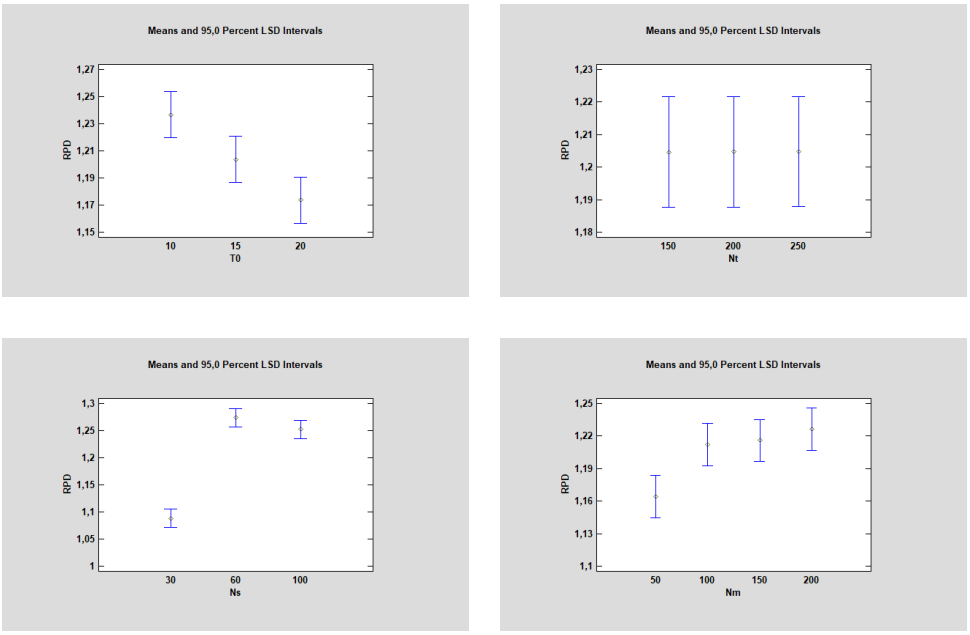


Figure 2: Results for calibration of HSA

Table 2: Tested parameter levels for ABC

Parameters	**Levels**
Population size P	25,50,75,100
Limit Lim	50,100,150,200

Analysis of Variance for RPD - Type III Sums of Squares

Source	*Sum of Squares*	*Df*	*Mean Square*	*F-Ratio*	*P-Value*
MAIN EFFECTS					
A:P	64,8379	3	21,6126	10,46	0,0000
B:Lim	88,5547	3	29,5182	14,29	0,0000
RESIDUAL	14856,6	7193	2,06542		
TOTAL (CORRECTED)	15010,0	7199			

All F-ratios are based on the residual mean square error.

The StatAdvisor

The ANOVA table decomposes the variability of RPD into contributions due to various factors. Since Type III sums of squares (the default) have been chosen, the contribution of each factor is measured having removed the effects of all other factors. The P-values test the statistical significance of each of the factors. Since 2 P-values are less than 0,05, these factors have a statistically significant effect on RPD at the 95,0% confidence level.

Figure 3: ANOVA: Results for calibration of ABC

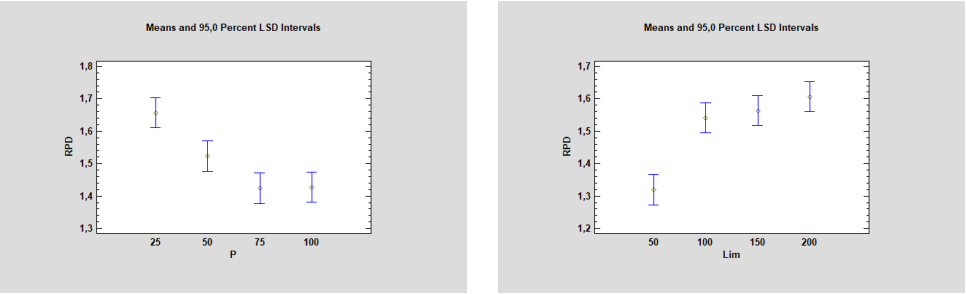


Figure 4: Results for calibration of ABC

Table 3: Tested parameter levels for GA

Parameters	**Levels**
PS	20,30,40,50
G_r	25,50,75
P_c	0.1,0.2,0.3,0.4
P_m	0.01,0.02

Analysis of Variance for RDP - Type III Sums of Squares

Source	*Sum of Squares*	*Df*	*Mean Square*	*F-Ratio*	*P-Value*
MAIN EFFECTS					
A:PS	3353,97	3	1117,99	248,87	0,0000
B:Gr	570,386	2	285,193	63,49	0,0000
C:Pc	125,955	3	41,985	9,35	0,0000
D:Pm	65,0913	1	65,0913	14,49	0,0001
RESIDUAL	291054,	64790	4,49227		
TOTAL (CORRECTED)	295170,	64799			

All F-ratios are based on the residual mean square error.

The StatAdvisor

The ANOVA table decomposes the variability of RDP into contributions due to various factors. Since Type III sums of squares (the default) have been chosen, the contribution of each factor is measured having removed the effects of all other factors. The P-values test the statistical significance of each of the factors. Since 4 P-values are less than 0,05, these factors have a statistically significant effect on RDP at the 95,0% confidence level.

Figure 5: ANOVA: Results for calibration of GA

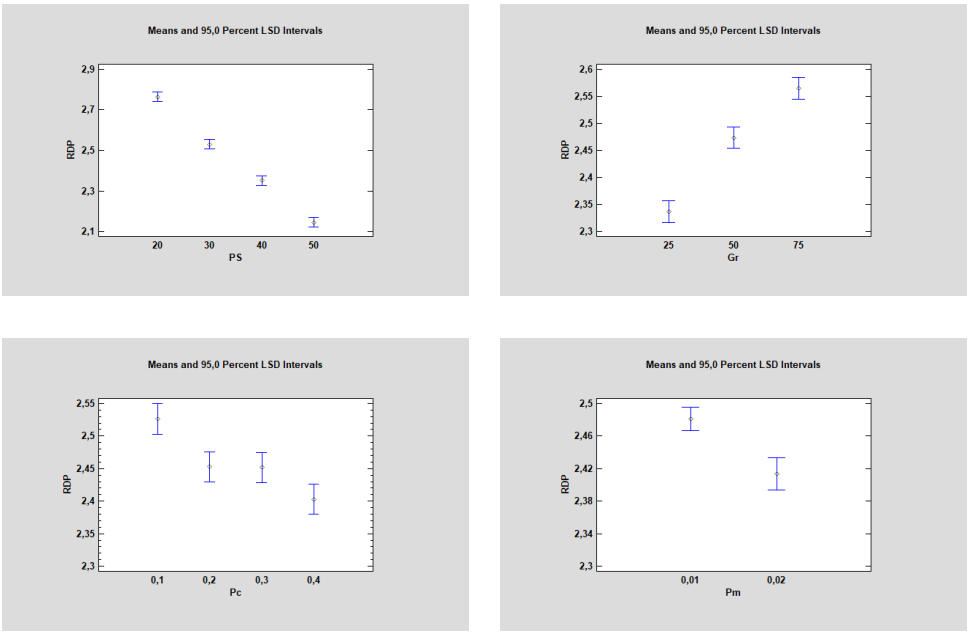


Figure 6: Results for calibration of GA

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